

An Account of some Books.

- I. *Observations touching the TORRICELLIAN EXPERIMENT, and the various Solutions of the same, especially touching the Weight and Elasticity of the AIR.* London, 1674. in 8°.

THE learned and inquisitive author of these observations, having thought fit not to prefix his name to this book, that so he might be the fitter (as himself intimates) to bear the correction of his errors, if any such should occur to his notice; we have no reason to blame him for that omission, but rather commend his modesty and diffidence, and withal entertain the hopes of seeing something publish'd hereafter from the famous patrons of the *Hypothesis* by him impugned, that may either contribute to the further elucidation and establishment of their Doctrine, if it be solid, or serve to rectify their mistakes therein, if it be ill-grounded.

Our author then, taking this difficult subject in hand, professeth in the beginning, that, to avoid the imputation of a Plagiary, he hath borrowed in this controversie some things from others, especially from *Franciscus Linus* and *Honoratus Fabri*, though he also delivers somewhat that's new, and makes the method and manner of Explication of it as much his own as he can; the which he performs in this order:

1. He explains some Terms which he hath occasion to use in this discourse.

2. He sets down some *Statical* observations, necessary to this inquiry; viz. concerning the gravitation of water upon water, of air upon air, or any subjected bodies in it; of heavier fluids upon those that are lighter; and of lighter fluids upon those that are specifically heavier, concerning which particulars, he endeavours to prove, *first*, that the upper parts of water do not actually gravitate or press upon the lower parts of it; where yet he acknowledges, they do gravitate *ad pondus* and physically upon the lower, so as to make the whole heavier, though they do not gravitate *ad motum* or sensibly:
Which

Which seems to be in effect the same with what the honourable *Robert Boyle* with clearness teacheth in his *Hydrostatical Letter*, printed *An. 1672.* upon the occasion of some exceptions made by *Mr. Sinclair* about a way of *weighing water in water*; where he saith, that the upper portion of water does really *press* the subjacent, tho' it doth not actually *depress* it; or, doth *gravitate* on it. but not *præ-gravitate*. Mean time, this author here pretends to prove the said non-pressing of water upon water both by reason and observation. After which he examines, whether the free and common air, wherein we live, (commonly call'd *Atmosphere*) extending upwards about seven miles or more, hath any sensible actual gravitation upon the lower world; and admit it have, whether any determinate portion of that atmosphere, as a column or inverted cone, for the purpose of six inches square at the base, hath any actual gravitation upon the subjected base, on which it is suppos'd to rest; and supposing it have, whether that gravitation be of any considerable, and of what, moment? Where he denieth not, that air *compress'd* may have weight in it, so as to gravitate considerably upon other air, either not at all, or less, *compress'd*; nor, that even the *free* air it self may have some *intrinsic* gravity, though exceeding little; nor, that this free air may have some, though very inconsiderable, measure of *actual* gravitation, which yet he thinks is scarce perceptible to sense, notwithstanding all the mixtures of vapours and steams from the earth and water. But that which he labours to maintain, is, 1. That the whole body of the atmosphere hath *no considerable* gravitation either upon its own parts, or upon the subjected body of the terrestrial globe, much less such a notable gravitation, as is suppos'd by those he disputes against. 2. That, if it had, yet any given portion or column of the atmosphere hath no such gravitation. Concerning the *former*, he thinks fit to say little, referring himself therein to *Franc. Linus's* tract *de inseparabilitate Corporum*, and to *Hon. Fabri* in the sixth of his late *Philos. Conferences*; and he scruples not to say, that there is not any instance or experiment, known to him, and alledged for the evincing of that pretended gravitation of the free air, but is readily capable of a more suitable solution, more adequately

quately fitted to the *phenomena*, and less incumber'd with difficulties, than the solution of the *weight* and *spring* of the air. As to the *latter*, he asserts, 1. That, tho' we should admit a considerable gravity of a portion of air, taken and divided as one intire separate gross body (as in a bladder, a glass-bubble, &c.) so that it partakes of the common quality of heavy bodies; yet there is a peculiar pressure or gravitation belonging to this subtiler fluid body, which hath its lines of direction *every way* within the compass of its own extream superficies, whereby that perpendicular gravitation, which is common to all bodies, is corrected, abated, and in a great measure suspended. 2. If there were no such allay given to its common perpendicular gravitation, by its proper motion, or its own gravitation; yet the air being one continued body, and so interwoven, and as it were mortais'd one part in another, the other parts of the air, that are contiguous every where to the earth, do sustain and bear it up, like the sides of an arch, from all sensible pressure or gravitation upon any determinate or particular body, that is within the compass of of its pressure. And although the air be mingled with vapours of terrestrial and aqueous *Effluvia*, heavier than it self, yet they are, *saith he*, so interwoven in the very web and texture of the air, that it supports many of them; and those that are too heavy for it, or much disunited and separate from it, are precipitated upon the superficies of the earth, and the air discharg'd of them, as in rain, snow, hail, &c. All which he attempts to make out by some experiments; which whether they be unexplicable by the *Hypothesis* contended against, we must leave to those that are concern'd to judge.

3. He sets down, what it is *not* that may be suppos'd in the space deserted by the mercury in the *Torricellian* experiment, *viz.* that it is not *Nothing*, nor *Air*, nor *Æther*, nor any body, that comes from without.

4. He declares, what he thinks it is, that possesses the place derelict by the quicksilver; namely, a *subtle corporeal substance extracted from the gross Mercurial body, or forced out of it*; not by *Linus's* way, which our author takes to be this, that by the descent of the mercury, and in *obsequium naturæ universalis*,

or

or for preventing of vacuity, there are taken away successively from the superficies of the Quicksilver certain scales as it were of an indivisible profundity, rarified into a subtle invisible consistence, which supply that deserted space, and make up a kind of *funiculus*, that suspends the Mercury to the Tube, and is co-extended to the whole vacant space gradually, as the Mercury descended. This way, I say, our Author rejects, alledging his reasons for doing so, and substitutes certain *Effluvia*, and subtle steams, sent out from the Mercury; affirming, that these steams, or vapours, are separated from that body, *First*, by way of *Expression*, or straining them out by the strong descending motion of the Mercury, and the compression of the inferior parts by the superior; as also the great agitation of its parts, the grosser Mercurial parts coming closer together, and expelling the more subtle and vaporous parts. *Secondly*, By way of *Extraction*, or drawing out those parts that are more subtle and fluid, and capable of expansion; whence he thinks ariseth that *lucta* and *mora* observed in the descent of the Mercury. And these parts thus extracted are, in his opinion, dilated to as great an amplitude and tension, as the strength of the descent of the Mercury, and the wideness of the space it leaves requireth; which tension also, he saith, contributes much to the retarding of the swiftness of the Mercurial descent. And because at about 29½ inches the weight of the Quicksilver decreaseth to such a state, as cannot work any further separation of subtle matter to supply any more room, it stays there, and descends no farther, not having strength enough at that height to separate any subtle matter from it self to supply the space it should leave by such descent. Where he considers, that although the immediate cause of the separation of the subtle matter of Mercury, and the expansion thereof, be the force of the descent, weight and pressure of the Mercury; yet this is performed to avoid the dissolution of Continuity, or (which is all one) a *Vacuum*.

5. What is not the cause that suspends the Cylinder of Mercury in the Tube to the height of about 29 inches; namely, not the Gravitation or Pressure of the impending Air, nor its Elasticity: Where our Author largely examines the doctrine of the

spring of the *air*, viz. 1. What *spring* is of all hands agreed to be truly found in the *air*. 2. What *spring* is substituted by the late philosophy, and how by the assertors thereof it is applied to the solution of *phenomena* of this kind. 3. What his reasons and evidences are to evince the mistake, as *he esteems* it, of this elaterical supposition; and how, in his opinion, some arguments for the weight and *spring* of the *air* may be answered.

6. What he thinks to *be* the cause that *suspends* the mercury from subsiding below 29 inches, or thereabout, in the *Torricellian Tube*. Where he affirms, that the cause, why the mercury falls so low as 29 $\frac{1}{2}$ inches, is, that the weight of the descending mercurial column is of that strength, as to give the included air that tension, or dilatation; and, why it subsides no lower, is, because, when the air hath attain'd its utmost extension that the descent of that column of mercury can give it that aerial cylinder holds it there, and keeps it up to that height, the weight of the mercury being now lessen'd. Which he undertaketh both to make out by some observations, and to free from what may be objected against it; to all which he adds instances by him conceiv'd fit to shew, that the tension of the air, or any other tensible body, necessarily effects attraction on the bodies to which it is contiguous. Which done, he considers, how it comes to pass, that, since there is yet remaining about 29 $\frac{1}{2}$ inches of mercury in the Tube, which doubtless hath a residue of subtle matter extractable out of it, to supply a greater room than what is yet left above 29 $\frac{1}{2}$ inches, that, *I say*, by the weight of that 29 $\frac{1}{2}$ inches of mercury, there is not more of the mercurial effluxes extracted and dilated, which may give a total descent, and an evacuation of all the mercury in the Tube, into the stagnant mercury in the subjacent vessel.

7. He sets down, and endeavours to answer, those objections, that seem to him of greatest force against the supposition of the former paragraph.

8. He examines particularly, and lastly, the cohesion of the polish'd marbles, and the *Magdeburgh* hemisphere, and the raising of water in common pumps.

So far of the contents of this *Treatise*: It not being the intent of the publisher of the papers to censure any books that are therein taken notice of; he only craves leave to say thus much of the piece he hath now given an account of, that some very learned and able men, who have perused the same, tho' they acknowledge it to be very ingenious, and containing more specious objections and experiments against the maintainers of the weight and spring of the air, than have been produced hitherto; yet they declare withal, that such objections seem not cogent to them, and that the experiments alledged to the contrary, may be solved by the very *Hypothesis* impugned by this author. So that we shall leave it to fit readers to judge, whether there be not already said enough by the Honourable *Robert Boyle* (to name here no others) in his *Physico-Mechanical Experiments*, both the first *Treatise*, and the *Continuation*; as also in his *Answer to Fr. Linus*; and in his new *Experiments about the Pressure and Spring of Air upon Bodies under water*; and likewise in his *Hydrostatical Letter, dilucidating an Experiment of weighing water in water*, printed with the same new *Experiments* against Mr. *George Sinclair*? And whether those real and visible things by which it appears that such a cause being put, such an effect follows, and the same cause being removed, the effect also ceaseth, be not indeed more satisfactory, than a *funiculus ex subtilibus Mercurialibus effluviis contextus*, fastning the Mercury to the Tube as far as 'tis void thereof?

II. *A Mathematical Compendium, collected out of the Notes and Papers of Sir Jonas Moore, by Nicholas Stevenson.* London, 1674, in 12°.

THIS well-stored Pocket-book contains abundance of useful practices in Arithmetick, Geometry, Astronomy, Geography, Navigation, Embatteling and Quartering of Armies, Fortification, Gunnery, Gauging, and Dyalling, explaining also the Logarithms with new Indices, *Nepair's* Rods, making of Movements, and the Application of Pendulums, with the Projection of the Sphere for an universal Dy-

al, &c. To all which is premised, *First*, A *Diary* for the year 1674, containing the description of the Year, Festivals, and Notable Days, Sun's Rising, Changes of the Moon, &c. with the Time of High-water at *London-Bridge*, with Rules to serve other places, calculated for each day from the *true South-ing* of the Moon, and a *new Theory of the Tydes*, differing, some days, above an *hour and half* from the ordinary rule, and computed by his Majesty's special command: *Secondly*, A perpetual Kalendar, and in it the uses of three small Tables for finding the Days of the Month, Sun's Place, Right Ascension, the Prime, Epact, Moon, Tydes, Stars, &c. for ever. *Thirdly*, A Table of Measures, Square, or Superficial; Measure for Horses, Agreement of Measures of other Countries with ours, a Table of Troy-weight, and that of Apothecaries and Averdupois, together with the best proportion of Troy and Averdupois, as also the manner of weighing all sorts of Commodities, and of dry Measures, a Table for Corn Measure, and of the Chaldron and Water Measure; Tables of Wine, Beer, and Ale Measure, the value and fineness of Gold and Silver, a Table of the Proportion and Weights of Mettals, Liquors, &c. a Table of the Assize of Bread for all Weights.

These particulars being premised, *Arithmetick* is first treated of, and in it Numeration, Addition and Substraction in Whole and Decimals; Multiplication and Division, with, or without *Nepair's Rods*, most easie and certain; Extraction of the Square and Cube Roots easily by the same Rods; The *Logarithms*, and their Use; Further of *Reduction* and *Decimal* Tables at large; Of Fractions; Of Progressions and Combinations; Of Proportion, direct and backward; Of the double Golden Rule, and continual Proportion; Ordinary Rules of Practice in *Arithmetick*; Rules for *Duo-decimal* *Arithmetick*; Rules of Practice for Interest, simple, or compound; Rules concerning Freeholds to be bought, or sold; A Table to purchase by, at 5, 6, 8, or 10, *per Cent.* Of the Uses of the Tables of Signs and Tangents.

In the *Geometrical* Part is contained the Resolution of Plain and Spherical Triangles, *Longimetry*, *Planimetry*, and *Stereo-metry*.

metry, *Longimetry*, the art of levelling, the measuring of hights or distances unapproachable, and the hights of several Steeples, Towers, &c. in *English* feet; some propositions geometrical for ordinary uses; a table giving the length of the parts of a circle. In *Planimetry*, the measuring of triangles, with and without a perpendicular; of squares, oblongs, regular or irregular figures; the dimension of circles, and other round figures; the best proportions for circles, spheres, cylinders, &c. measuring of pavements, plaistering, wainscoting, &c. measuring of carpenders and brick-work; tables, to cast square feet into perches of a brick and a half thick, &c. to turn square inches into sticks, and parts of tapestry; to turn square inches into feet, quarters and inches. In *Stereometry*, or measuring of solids, as tapering timber, spheres, sectors, and segments of spheres, spheroids; tables, for plain and solid measure; for turning solid inches into solid feet, and for finding a foot by the superficial content at the end of timber or stone; the measuring of earth-work, as cellars, vaults, ramparts, &c. A table to turn solid feet into flours, quarters, &c. measuring ships, vessels, &c. to double a cube: by the magnitude or weight of any body, to know the weight of another body, & *contra*; the weights of mettals, stones, &c. in water; two tables for turning solid inches of water into *averdupois* weight, and contrarily; the measuring of all irregular bodies by sinking them in water; of the *Gauging* of vessels; tables for turning any number of solid inches into wine-measure, or into beer or ale-measure, as also into dry measure; the measuring Vessels not full.

After this do follow the instructions for *Embatteling* of Soldiers for *Castrametation*, *Fortification*, and *Gunnery*; concerning which last, there is a Table of the Names of Guns, their weight, bore, shot, powder for proof and service, as also the Names of the Implements belonging to a Gun; to tertiate, to dispart, and to know the bore; about the shooting in great Guns, with their ranges, and a Table of ranges.

As for *Astronomy*, here are deliver'd Problems for practice of plain and spherical Triangles, and Problems of the Sphere; and then, the obtaining of the Hour and Azimuth by taking the height of the Sun.

Concerning *Geography*, he treats of Zones, Inhabitants, Climates, Maps, Lands, Seas, and gives exact rules to know the distances and positions of places, and likewise the way to know the contents of any parcel of the earth in square miles, contain'd in any triangle.

Next, he teaches *navigation* by the plain sea-chart, by *Mercator's* Chart, and by a great circle; where is added, a table to turn the *rumb*s into degrees and minutes; together with some Problems for knowing the ships way on a great circle, upon a parallel, or upon any rumb.

In the doctrine of *dyalling*, he gives us the way of making an horizontal or erect dial; then a mechanical way for all dyals, and very exact; the discription and use of an universal dial, being a new projection of the sphere, together with the uses thereof in very many propositions, both for hour and azimuth, and the stars; to which is added, a discourse of the nature and fabrick of watches, clocks, and other movements, with directions of *Pendulums*; and how we are to find the numbers of beats, which a movement makes in an hour or minute, turns of the fusy, and length of going; treating particularly of pendulums, the universal measure, length of pendulums, and the way of regulating the inequality of a pendulum, and how to know, what alteration in time the lengthing or shortning of a pendulum to a tenth of inches will make; moreover, of finding out fit numbers for the wheels and pinions. To which are subjoyn'd, examples for small and greater clock and watch-work; and a rule of giving particular motions. Which is followed by a note concerning *time*, and the length of the solar and sidereal days, and how to adjust the pendulum; and then, by the uses of the tables of the Suns right ascension; to which is added, the mention of an 100 notable stars; and of 22 stars about the north-pole, concerning which latter stars, here never rising or setting, there is an excellent and useful table, which shews their right ascensions, and their time and azimuth, when they come under the *pole-star*; whence, if you do but hang up a thread and plummet, and looking thro' a hole to take away the stars ray, observe, when any of these 22 stars come with the pole-star to that perpendicular; if you subtract the suns right ascen-

ascension from the hour of the stars coming under the north-pole, you have the true time of the *night* to a minute.

At the latter end of the book is to be found, 1. the table of logarithms for all numbers under 10000; 2. the table of proportional parts; 3. the table of signs and tangets to each degree and 10; 4. a table of the prizes of commodities, from 1 to 10000 pounds, ells, yards, &c. 5. a table comparing the *English* foot and pound with forrain feet and pound; 6. a table for gauging casks not full; 7. a table of meridional miles and parts; 8. a table of the right ascension of the sun; and 9. another of the longitude and latitude of 100 notable fixed stars, with their right ascensions in degrees and time, and declination for *An.* 1680; with the difference for every ten years, to supply them for ever.

III. *Icones & Descriptiones Rariorum Plantarum Siciliae, Melitae, Galliae, & Italiae.* Auth. Paulo Boccone, *Panormitano Siculo*, &c. E. Theatro Sheldoniano, 1674.

THIS industrious and skilful Botanist, having spent many years, and much labour, in the search after rare plants through *Sicily, Italy*, and other countries, thought fit to publish part of them here in *England*, where he was himself not long since, and very generously left his engraven plates and manuscripts concerning the same, to be printed, as now they are, in the splendid *Sheldonian* Theatre at *Oxford*. There are above an hundred plants, represented in 45 plates, and those (a few ones excepted) not describ'd elsewhere. Amongst them is found a fruit, in appearance an *Orange*, but fill'd with a citron-pulp; to be met with in the gardens at *Rhegium* and *Messina*. There is also describ'd a certain *Fungus* of *Sicily*, with a blewish pulp, and a coriaceous shell, with the decoction of which latter, they at *Messina* dye wool and cloth of a purplish colour. Notice also is taken of a *Kali Sculum*, having sometimes a root bigger than a mans thigh, and yielding ashes exceeding useful to wash, and whiten linnen. Nor may we pass by the *Fungus Typhoides coccineus* of *Maltha*, by reason of its celebrated astringency and virtue in staunching of blood; nor the *Heliotropium* of *Sicily*, with a flower extraordinary both for bigness and sweet scent, &c.

It is much wished, that this author, whose genious and abilities are considerable in the search and study not only of plants, but also of other observables of nature, may find suitable encouragement to continue his diligence for further discoveries of that kind.

IV. *Navigation and Commerce, their original and progress containing a succinct account of traffick in general; its benefits and improvements; of discoveries, wars and conflicts at sea, from the original of navigation to this day; with special regard to the English nation; their several voyages and expeditions unto the beginning of our late differences with Holland; in which his majesties title to the dominion of the sea is asserted against the novel and late pretenders; by J. Evelyn Esq; F. R. S. printed 1674, in 8^o.*

ONLY a part of this title was nam'd for an other purpose in the last tract, *Numb. 103. p. 59.* In this elegant discourse, besides the largeness of the historical collections, the worthy author excites *England*, and adviseth the most advantageous preparations for our future defence, and for aggrandizing our trade and commerce; which ought to be our care, whilst we have the opportunity, and whilst we are less concern'd spectators of the wars round about us.

Note, The mistake in N^o. 103. p. 57. l. 17. in the answer of Janus, gives us the opportunity of inculcating a stronger impression by the amendment, thus; Janus being asked, Why, when we sacrifice to other Gods, the frankincense and wine must be first offer'd to his Godhead?

*Ut possis aditum per me, qui limina servo,
Ad quoscunque voles, inquit, habere Deos.*

Then to the question, Why chearful and good words must celebrate his calends?

Omnia principiis, inquit, inesse solent:

Chearful beginnings of the particulars there mention'd, viz. Nurseries of Mulberries and Vineyards, would raise our hopes to see England in few years well improv'd, according to the religious or mysterious observations of the old Greeks, and no less prosperous Romans.

L O N D O N,

Printed for John Martyn, Printer to the Royal Society, 1674.